NEWS

Optogenetics: Controlling body movements

Optogenetics is the combination of genetic and optical methods that allows scientists to control specific types of neurons by genetically programming them to express light-sensitive proteins. These proteins, called opsins, act as ion channels or pumps that regulate neuron's electrical activity. Some opsins suppress the neuron's activity when light shines on them, while others stimulate it.[1] For example, the light sensitive protein channel rhodopsin 2 (ChR2), which is normally found in algae activates the cell it is expressed in, when exposed to blue light.[2] With optogenetics, you could target the specific subsets of neurons that have certain characteristics similar to each other. This strategy has significant advantages over existing techniques that use pharmacological interventions and electrical stimulation to study the neuron's activity.[1] Researchers have created a genetically modified mouse in which excitatory neurons, which are believed to be important for initiating walking; can be activated or inhibited by shining blue light.[2] Also, scientists have designed specialized motor neurons that allows them to fine-tune muscle control by adjusting the intensity, duration and frequency of the blue light pulses.[3] Recently, it has been reported that these light activated neurons created from stem cells have the potential to restore function to muscles paralyzed by conditions such as motor neuron disease and spinal cord injury.[3] Hence, this offers a new approach to study the complex spinal circuits that coordinate movement and sensory processing.

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Skill in conflict management prevents premature death

Frequent arguments or conflicts with partners, children, relatives, or neighbors may increase the risk of mortality from any cause in middle age.[1] According to a prospective cohort study, during the study period between 2000 and 2011, 196 women (4%) and 226 men (6%) died; almost half the deaths were from cancer, while heart disease/stroke, liver disease, accidents and suicide made up the rest.[1] High levels of arguments with the family and friends were associated with a 40% higher risk of ischemic heart disease.[2] It was also reported that frequent or constant source of excess demands and worries from their partner or children, were linked to a 50%-100% increased risk of death from all causes[1,3]; especially men and those without a job are most vulnerable.[1] Evidences also suggests that supportive social networks and strong relationships are good for general health and well-being.[3] Irrespective of the factors mentioned, personality of an individual plays a role in, how to perceive and respond to stress, and hence may influence the individual's risk for an early death. Therefore, skills in conflict management may help to curb premature deaths associated with social relationship stressors.[1]

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Iron deficiency plays a crucial role in ischemic stroke

An ischemic stroke occurs when the blood supply to the brain is interrupted by a small clot, causing a permanent or fatal damage in these patients.[1] Every year, 15 million people worldwide suffer a stroke, of which nearly 6 million die and another 5 million are left permanently disabled.[2] It has been reported that low levels of iron in the blood were a strong risk factor for blood clots, which could in turn lead to ischemic stroke in these patients.[2] Even moderate decrease in the levels of iron, around 6 μM/L (normal range of 7–27 μM/L) doubles the risk of ischemic stroke.[2] Patients who took iron supplements reduced risk for stroke when compared to patients who were not under supplementation.[3] Reports from the world's largest ever trial of the drug, published in the lancet neurology, demonstrates that treatment with rt-PA (clot-busting drug) improved health of stroke survivors up to 6 months following an ischemic stroke.[3] Also, patients when treated with a clot-busting drug within 6 hours of a stroke were having a long-lasting recovery when compared to those who do not receive the treatment. However, the benefits of this treatment come with a price; patients are at risk of death within seven days of treatment, as the drug can cause a secondary bleed in the brain.[1] Thus, iron deficiency plays a crucial role in the genesis of ischemic stroke by regulating the blood clotting factors in this high risk group.

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VIEWS

Anti-hypertensive drugs are best taken before bedtime

High blood pressure (BP) if not treated, over time can lead to several cardiovascular diseases including heart attacks, paralysis, embolism, aneurysm, and heart failure. In most of the patients with uncontrolled blood pressure such attack**s** occur in the early morning hours. This could be due to the higher heart rate, increased systolic and diastolic BP, as well as thickening of platelets in the early morning. Therefore, controlling early morning BP in hypertensive patients might reduce the cardiovascular mortality.It has been reported that, in patients with chronic kidney disease and high BP who took at least one antihypertensive drug at bedtime significantly improves BP control and had approximately one third of the cardiac risk compared with those who took all medications on awakening. According to the study, for every 5 mmHg decrease in mean systolic upper BP during sleep, there was a 14% reduction in the risk for cardiovascular events during the follow-up. The urinary albumin excretion was also significantly reduced in subjects taking antihypertensive drug before bedtime but not in those taking medication in the morning. Therefore, it is suggested that the potential benefits of antihypertensive drugs can be achieved at its best when taken at night.

Fracture risk inherited across two generations

According to a study, published in the Journal of Clinical Endocrinology and Metabolism, the hip fractures in grandfathers were observed to be linked to the low bone density and reduced bone size in their grandsons. This is the first report that demonstrates the inheritance of fracture risk across two generations. Further it also reported that, men who had a male relative who had suffered a hip fracture, had up to 5% less bone density

and 4% reduced bone size compared to others. On comparison, it was suggested that those with 10% less bone density, run a threefold greater fracture risk in future than their peers. Despite the other risk factors for osteoporosis, such as smoking, physical activity, calcium intake, age, weight and gender, reduced bone size and low bone density has emerged as a potential osteoporotic risk factor. In other words, Grandpa's broken hip may mean weaker bones and increased fracture risk for his grandsons. This new risk factor (history of hip fracture in grandparents) could lead to improvements in the identification of patients at increased risk of osteoporosis, which could result in the better diagnosis and treatment of osteoporosis.

Energy drink augments cardiac risk

Production of energy drinks has become a multibillion dollar industry, which is still growing. Most energy drinks such as Monster, Red Bull and Rockstar have three times the amount of caffeine as colas. Teenagers and young adults of all demographics have become one of the largest consumers of energy drinks. It has been noted that energy drinks high in caffeine when consumed by healthy adults, significantly increases rate of cardiac contraction after one hour. Clinicians have observed consumption of energy drink may raise blood pressure and prolong QT interval, increasing the risk of sudden cardiac death. Researchers have found that college students tend to drink more heavily and become more intoxicated on days when they used both energy drinks and alcohol, compared to days they only used alcohol. Users of energy drinks reported two or three fold increased recent use of alcohol, cigarettes, and illicit drugs, compared to those who didn't use energy drinks. Despite the reports on the products' potential adverse side effects on heart function; especially in adolescents and young adults, there is little or no regulation of energy drink sales, which should rather be banned.

Caffeine in coffee reduces birth weight

Maternal nutrition plays a vital role in embryo development and health of the child later in life. However, not everything an adult might consume is beneficial to a developing baby. Recent reports have shown that caffeine consumption is linked to low birth weight and increased gestational length in pregnant women. Caffeine is the most widely used psychoactive drug found in more than 60 known species of plants, and dietary sources including coffee, tea, cocoa beverages, chocolate, and soft drinks. A low dose of caffeine is known to increase alertness, reduce fatigue, and elevate mood. But as per the recent reports, caffeine intake by mothers *per se* has an impact on birth weight of the baby. It is not only the caffeine but also its source that affects the pregnancy outcomes. For example, 100 mg caffeine per day from all sources have increased the length of the pregnancy by 5 hour and reduced birth weight of the baby, but every 100 mg caffeine intake per day from coffee was associated with an even longer gestational length of 8 hour. As this association was not observed in women who drink only tea, it is understood that it is not just the caffeine in coffee which increases gestational length but there must be a substance in coffee which is responsible for this increase in gestational length. These reports demands for re-evaluation of the recommendations for caffeine intake as even 200-300 mg per day can increase the risk of reduced birth weight.

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